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WATER RESOURCES OF FREDERICK COUNTY, MARYLAND

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ABSTRACT

The water resources of Frederick County, Maryland, were assessed in order to provide the hydrologic background necessary for planning, developing, and other activities. Twenty-five drainage basins (including two that drain into the county) ranging in size from 3.04 to 968 square miles were delineated.

Ground water occurs primarily under unconfined or semiconfined conditions in fractures in metamorphic and sedimentary rocks; its circulation is generally controlled by local topography. Aquifer diffusivity ranges from 6,400 to 74,000 feet squared per day, and transmissivity rarely exceeds 1,000 feet squared per day.

Reported yields of 1,582 wells range from 0 to 950 gallons per minute, with a median of 10 gallons per minute. About 5 percent of these wells were reported to yield less than 1 gallon per minute, and about 11 percent yielded less than 2 gallons per minute. Specific capacities of 1,177 of these wells ranged from 0 to 262.5 gallons per minute per foot of drawdown, with a median of 0.15 gallon per minute per foot. More than 60 percent of these wells were drilled for domestic use and were not located to provide maximum yield. Wells may be grouped by various factors such as topographic setting or geologic unit, but within-group variation in yield remains large. Yields of individual wells generally cannot be accurately predicted.

Streamflow characteristics are described for 26 stations on 19 streams. Seven-day, 10-year low flows range from 0 to 0.170 cubic feet per second per square mile. The greatest values tend to occur in the southern basins and the least occur in the northern basins.

Most of the ground water is calcium-magnesium-bicarbonate type, ranging from soft to very hard. Incidents of ground-water contamination have occurred, but were very localized. Stream water, sampled under base-flow conditions, has chemistry similar to that of the surrounding ground water. Stream-bottom

materials were analyzed for trace elements or pesticides, some of which were present at low levels in some of the samples.

The average annual hydrologic budget for the county is: Precipitation (48 inches) + Incoming Streamflow and Underflow (13 inches) = Surface Runoff (25 inches) + Subsurface Runoff (11 inches) + Underflow Leaving the County (0 inches) + Evapotranspiration (25 inches) + Change in Storage (0 inches). Budgets were also estimated for individual basins. Areal draft-storage relations were developed based on the low-flow characteristics of nine gaging stations in the county. The total water resource is vast but not uniformly available, a factor that will influence growth and development in Frederick County.

Also available from Maryland Geological Survey:

Basic Data Report No. 15: Ground-Water and Surface-Water Data for Frederick County, Maryland, compiled by James R. Dine, Michael D. Tompkins, and Mark T. Duigon (1985).